Assessment of High School Students' Exposure to Engineering via a Summer Camp

Karinna M. Vernaza, Theresa Vitolo, Scott Steinbrink, Barry J. Brinkman
Gannon University, Erie, PA 16541
vernaza001@gannon.edu, vitolo001@gannon.edu, steinbri001@gannon.edu, brinkman001@gannon.edu

Abstract **- The School of Engineering and Computer Science at Gannon University has developed an intensive week-long summer residential program. The intent of the summer camp is to allow high school students an opportunity to learn, understand, and participate in various phases of engineering projects and to offer them a taste of college life. The program is aimed at students entering their junior or senior years of high school, who have an interest in hands-on learning about engineering as a profession. The activities focus on various phases of the engineering design process, and student's team-playing and team-leading abilities. Students are introduced to the different engineering disciplines, career prospective, and job opportunities by the interaction with faculty and undergraduate students from Electrical Engineering, Mechanical Engineering, Environmental Engineering, and Computer Science. By attending the summer camp, Gannon believes that students will be more equipped to make an informed decision in their choice of career. The camp has been well received during its six years and has served as a recruiting tool. The paper outlines the camp objectives, planning process, recruitment process and results. Based on the exit surveys results, modifications have been made to the original camp structure to introduce new areas in order to allow students experience different fields of engineering and improve their experience and participation. A critique to the program is presented that includes its demonstrated benefits, a discussion of the lessons learned to date from the experience, and recommendations on how to make it even more effective in the future.**

Index Terms - Experiencing engineering, Hands-on learning, High school, Summer camp.

INTRODUCTION

Gannon University Engineering Summer Camp started in the summer 2001. The initial goal was to introduce the state-of-the-art statistical quality-control design process, better known as *Six Sigma*, employed by industry to high school students. The *Six Sigma* design process is focused on the phases: *define*, *measure*, *analyze*, *identify*, and *validate*, which involve a wide range of statistical tools. These tools were integrated with the weeklong summer camp program. High school students were given the opportunity to learn, understand, and participate in various phases of engineering projects design that are based on measurement and statistical concepts.

As the Engineering Summer Camp has evolved at Gannon, two main goals have surfaced. The first and primary goal is to nurture the participants' interest in engineering and give participants a better feel for engineering to help them make a more informed choice about their course of study in college. The second goal is to use the camp as a recruitment tool by showcasing Gannon and what we have to offer engineering students.

The camp is currently aimed at students entering their junior or senior year of high school who have an interest in engineering. One main thrust of the camp is to foster this interest and assist the students along a path towards a career in engineering.

There are several aspects used to foster an interest in engineering. First, the camp is designed to be enjoyable as well as educational. The participants should leave the camp with the feeling that engineering is not just hard work, but hard work that is somewhat enjoyable. Also, it is a summer program and the experience should be different from the normal school year routine. As the camp has evolved, most lecture time has been eliminated and the projects, both the shorter and longer projects, are almost entirely hands-on.

The second aspect of the engineering focus is that the projects are designed to introduce several different disciplines during the week. Since the School of Engineering and Computer Science provides oversight for the summer camp, the content included is inline with the majors offered. The specific projects spanning Electrical Engineering, Mechanical Engineering, Environmental Engineering, and Computer Science are discussed in detail in the following sections. The projects give students a peek at the kind of work they might expect in each of the disciplines. In addition to creating additional interest, this aspect helps students make a more informed choice about their course of study in college.

Participants also meet peers with similar interests. Since the campers usually get along quite well, the feeling is fostered that continuing in engineering will allow them to work with other people that they like. Also, for students from smaller high schools, the concept that "there are others out there like me" is reinforced.

A second goal of the camp is to advertise and show off Gannon University. Like many smaller universities, Gannon faces the problem of letting potential students know that it exists. A second problem is letting potential engineering students know that Gannon offers several engineering programs.

In addition to experiencing engineering and a taste of college life in general, the camp offers students a look at college life at Gannon. During the week participants live in

Gannon dorms and eat Gannon food. They interact closely with Gannon faculty and Gannon undergraduate students in a more informal setting. Overall, they gain a richer experience of the Gannon campus than through a normal on-site visit. There is no real attempt to "sell" Gannon University during the week. The overall experience shows who we are and what we do. Campers are left to interpret the experience based on their interests and preferences.

External Support Efforts

While much of the financing for the summer camp comes from the charged tuition, the organizers seek support from local sections of professional engineering societies. The three major external supporters are ASME (American Society of Mechanical Engineers), IEEE (Institute of Electrical and Electronics Engineers), and EESC (Erie Engineering Societies Council), the regional consortium of engineering societies. Each of these organizations has a charge to promote engineering as a career choice by students. The summer camp enables the organizations to advance their own societies' educational goals without bearing the direct commitment of organizing and developing an educational program of their own.

At the start, each society gave support comparable to a single camper's tuition. Currently, the groups offer about three times the support of the early years. Support has increased from the organizations as the success and visibility of the camp has developed. In order to maintain the relationship with the societies, the directors of the summer camp provide summary project reports to the Executive Boards of the societies. Through this simple courtesy and communication process, summer camp keeps the societies abreast of the effects of their donation. Consequently, the societies have consistently been willing to provide an ever-increasing donation.

Modifications to Original Camp Structure

A variety of instructional lectures were originally scheduled based on the *Six-Sigma* approach. Based on the students' surveys and faculty assessment, it was decided to minimize the lecture time so as to maximize the hands-on activities. In summer 2006, three new projects were formally introduced to the camp: Bioinformatics, Bioforensics and an Environmental component. These three activities are representative of majors offered at Gannon and they address popular new trends in the field of engineering. It is thought that their addition will allow the camp to cover a broader range of interests and attract more students.

CAMP OVERVIEW

The one-week long camp runs in July from Sunday afternoon to Friday evening. Activities, which are described in the next section, are scheduled from Monday through Friday starting at 8:00 a.m. and continuing to 5:00 p.m. Lunch and dinner for all participants and staff are provided each day. Evenings are reserved for recreational activities and a couple of open lab sessions. Participants stay in dorms and the undergraduates staffing the camp stay overnight with the campers. During the closing/awards ceremony (Friday evening), students are surveyed to determine the strengths, outcomes and weaknesses within the camp format.

Sunday afternoon consists of the registration, a welcome reception and a couple of ice breakers sessions to allow the campers to meet each other, the undergraduates working with the camp and the faculty involved. Since five of the activities are team projects, the ice breakers are used to divide the campers into groups for each activity. The intent is to allow them to interact and work with as many of the campers as possible. Sunday afternoon, also allows parents to meet the adults involved and have any anxieties calmed.

PROJECTS

Campers are engaged in a variety of activities. The major highlights are presented in this section focusing on what is currently being done, the modifications made to the content of the activities and the students/faculty perception

IT/CIS components

The Department of Computer and Information Science (CIS) sought to include content inline with the majors offered by the department, currently computer science, management information systems, and software engineering. Currently, through the use of Adobe Photoshop and Adobe Premiere (http://www.adobe.com), the campers build a video portfolio of their camp experience. The campers explore the techniques needed to work with various media and to incorporate clips and files together into an organized structure. The video competition assesses the use of multimedia techniques to produce a good illustration of the camp experience. In addition, each summer, a one-hour window is targeted for an information technology (IT), lecture-style component.

The CIS effort often is not satisfying for the staff, not desired by the campers, and not received well. The first problem is one of content: What CIS material and techniques can be adequately presented so that the campers (1) can produce a tangible result, (2) can produce a result that can be differentially assessed for a competition, and (3) can produce a personally satisfying "I can do this! I like this!" sentiment? The second problem is one of background. The campers come with a heavy predisposition for mathematics and the physical sciences. Many of them do not come with a software or systems inclination. The video-portfolio lab replaced the web-page development because many of the CIS-inclined campers were competent in web development and those who were not inclined were highly limited in their potential to produce a satisfying and competitive end-result. The video-portfolio lab sought to reveal the basics of graphics and image manipulation with technology and software. Since most of the campers have video-gaming experience, the attraction of the content seemed natural. The video-portfolio lab's acceptance by the campers has been better, but the CIS components are usually less favored in the exit responses than the other components.

The IT-lecture component also wrestles with determining an appropriate content fit. The guiding principle for the lecture has been "to present the range of IT career

possibilities by connecting the presence of "engineered" IT elements in their society". The delivery of this principle has ranged from simple discussion-and-lecture sessions to Jeopardy-like games to career web-quests. The campers perform career web-quests and explore the wealth of information about all careers readily available at the Bureau of Labor Statistics (http://www.bls.gov/). The "career web-quests" activity has been well-received since it offers any camper the opportunity to actively assess career plans.

ME Component: Trebuchet Activity

In one of the activities which highlight Mechanical Engineering, campers design and build mid-sized trebuchets. The trebuchets are made from commercially available 2x4 (inches) lumber, in 8-foot lengths. Campers use their trebuchets to hurl 1-pound projectiles at defined targets. The goals are accuracy, repeatability, and efficiency.

The design of the trebuchets is largely pre-set; campers have a set of five dimensional parameters which can be adjusted as design variables. In order to choose the values of these variables, campers use a computer simulation tool that takes into account all of the independent design variables (along with dependent variables and fixed parameters) and predicts range and maximum height of the thrown projectile.

In performance of this activity, campers are exposed to several engineering design concepts. The use of simulation for design somewhat exposes the relationship between computation and mechanics, and also points out some limits on the validity of simulation. The software employed, for example, has no capability to include the effects of wind, nor of sloping ground and does not account for nonlinear effects of scale. Thus campers see that computational simulation is extremely useful for mechanical engineering, but that it only supplements – it does not replace – hands-on experimentation and calculation.

In addition to teaching about mechanical concepts and simulation, this activity is also very useful for getting the campers out into the weather, making the camp a more active event and also helping campers release energy. The event is consistently ranked as one of the more popular activities.

ME Component: Beam Design

The second activity showcasing Mechanical Engineering is the design, construction and test of a beam. The objective is to achieve a maximum-strength beam out of wood board to span 27.5 inches and carry a concentrated load at mid-span. Each group receives one 3 foot squared piece of wood, 3/8 inches thick. The entire beam is to be constructed exclusively with the materials provided: wood and 12 ounces of glue. Participants are not provided with much background information for this exercise; they are briefly introduced to bending stress and mass moments of inertia. The purpose is to provide an "open-ended" problem that does not have a single solution and that is not easily solved from similar examples provided. As in the real world, participants are faced with constraints, which can be easily modified from year to year. For example, in 2006 the two restrictions incorporated were (1) a maximum height of 12 inches and (2) the maximum width of 12 inches.

In addition, the campers are introduced to the mechanical testing laboratory with this activity. A SATEC machine (universal mechanical testing) is used during the three-point bending tests. Campers are able to witness the loading of each beam and discuss the advantages of one design over the other. Basic principles of structures are discussed and validated.

CIS/Software Engineering Component: Robotics Activity

In an activity designed to highlight programming, campers design and build cars which are controlled by a programmed on-board microprocessor, the RCX. The cars are built using Lego Mindstorms™ kits, are programmed using ROBOLAB, a graphical programming language, and controlled by the RCX "brick".

In its current format, the activity is loosely based on three contests: a drag race, a timed lap race following a course laid out with black tape, and a pulling contest. Each team is still given a sample vehicle, but teams can design their own vehicles which may be different for each contest. A team need not participate in all contests.

The activity begins with a brief introduction to the ROBOLAB programming system. After that, the teams independently begin to design vehicles for the three contests and to create an appropriate program for each vehicle. The programs are simple for the dragster and the puller, but are more complex for the line follower which uses feedback from light sensors to stay on track while following the course.

Some participants seem to enjoy the design and construction of the vehicles more than writing the control programs. Others prefer the software aspects and often gravitate to the lap racer and its more sophisticated programming requirements. This loosely-structured approach to the activity seems to appeal to most of the participants, where each can focus on the aspect that he/she finds most enjoyable. It also provides an opportunity to blend individual work and team work. Since the teams that work more closely together seem to score better in the contest, a nice byproduct of this activity is the "teamwork leads to success" lesson learned by most campers.

During the early years of the summer camp, several shorter, more structured projects were used as the basis for the Robotics activity. Each project focused on solving a particular problem using a pre-built car. This format was well suited to some of the participants, especially those with an interest in programming and related problem solving. Unfortunately, many participants found this approach mildly interesting at best. Many participants seemed to "just want to build something" with the Legos. They found too much lecture time and too much structure to the projects. The structure was relaxed a little each of the first four years leading to the current format of the activity.

Electrical Engineering Component

In this activity, the campers build and calibrate a voltmeter. A digital voltmeter kit is provided to each one of the participants. Campers learn to identify specific parts, such as capacitors, resistors, diodes, transistors, and to identify the values of resistors and capacitors. Participants are

introduced to soldering, wiring, and fabrication techniques. After the meter is built and calibrated, a pre-built circuit is used to measure voltages of known values in order to test the effectiveness and accuracy of the voltmeters. Each camper takes home a working digital voltmeter.

For the majority of the campers, this is their first experience soldering. A high sense of satisfaction and personal achievement has been observed as a result of this activity which is constantly rated as one of the favorites.

During the first three years, campers were lectured on verification of measurements and data variation. After the voltmeter was tested with the pre-built circuit, the data was collected and it was verified that the distribution was normal. As a result of the reduction of lecture time, this is not currently performed.

New Projects

Three new projects were introduced in summer 2006. A short description is stated below. Not enough data exists to assess their effectiveness at the moment, but a positive feedback was given by the campers.

- **Environmental Science Component**: Campers perform measurements of water quality parameters on Presque Isle Bay aboard Gannon's research vessel, the *Environaut*. Measurements include oxygen concentration as a function of depth, pH, temperature and other indicators of water quality. This activity has replaced the industrial tour. A detailed explanation follows under the tour section.
- **Computer and Bioforensics**: Forensics covers the identification, preservation, extraction, documentation and interpretation of digital/bio evidence. Campers apply concepts presented by the instructor to hands-on lab exercises utilizing industry standard techniques and software.
- **Bioinformatics**: The focus of this activity is to explore how to store and analyze raw biological data. Participants explore a variety of areas in bioinformatics with hands-on laboratory experiences.

NON-PROJECT ACTIVITIES

In addition to the various design and science related activities, the camp schedule has included several events which are thought to provide an important auxiliary component. These activities include educational tours, recreational activities and ceremonial events.

Tours

The "tour" event has been excised from the program. In its place, we have inserted the Environmental Science component into the curriculum. Removal of the tour event is primarily a response to student feedback which indicated dissatisfaction with that event. As it happens, though, it has been possible to simply change the focus of the tour, which has greatly enhanced camper satisfaction.

Historically, educational tours have taken either of two forms for camp sessions: "traditional" tours, and practical data-gathering expeditions. In the traditional tour, the work that is done at a local manufacturing facility was described by a representative of that organization, and students were taken around the facility to see the processes and equipment used in the manufacturing work. Students typically felt that the traditional tour was rather boring.

In the data-gathering tour, students took samples of water, sediment and aquatic fauna from Lake Erie. The tour was performed on the research vessel *Environaut*, which is owned by Gannon University. The focus of this "tour" was less on the environment than on the tools used for environmental measurement. While this tour was better received than the traditional tour, some campers also disliked the *Environaut* experience. Campers most commonly cited three reasons for dissatisfaction with the boat tour: either the boat is not fast enough to suit their preferences, they did not like being on the water, or they did not like dealing with bay sediment – or the organisms it contains.

On the whole, the *Environaut* tour was better liked than the traditional tour. In addition, use of *Environaut* gets campers into the weather to expend energy, and also exposes them to some of the natural beauty of the region. This tour also made use of a resource which is a permanent asset of the university. It was clear that the *Environaut* should be favored over the traditional tour format. Thus, a change in the event was desired, that would increase camper satisfaction. The specific change came in shift from focus on engineered tools for environmental sampling to focus on the samples themselves. As a result, the camp now has a significant Environmental Science component that has been well-received.

Recreational Activities

Recreational activities have always been a part of the summer camp schedule. It is useful to allow for some fun time that is just FUN. To that end, recreational activities are incorporated into the schedule for Monday, Tuesday and Wednesday evenings. (Thursday evening is open lab time, for campers or groups to work on projects; Friday and Sunday have social events.) Recreational events serve as relationship builders, and help realize the secondary goal of promoting the university. In the spirit of truth in advertising, all selected events are commonly available to Gannon students. These include a beach cookout, games night at the Student Union, and a rousing night of laser tag. In addition, campers are free to socialize among themselves in the dorms at night.

Ceremonial Events

It is crucial to tie up loose ends at the end of the camp, and to drive home a sense of achievement among the campers. This is effectively done by means of an awards ceremony and banquet held on the last night of the camp. Parents are encouraged to attend; it is hoped that the enthusiasm parents show for recognition of their children's achievement will factor into the campers' decision whether to further pursue engineering education. The ceremony also is used to shore up the secondary goal of showcasing Gannon University, by making a positive impression on the parents of prospective students.

RESULTS

Enrollment

The admission process for the summer camp is not competitive. The camp is advertised to high school students in the area by means of emails, brochures and post cards which are sent out by the Admissions Office. Acceptance is on a first-come, first-served basis. The target number has been 24 campers. As presented on Table 1, the numbers were consistent in the first 4 years. During 2004, applications increased and the camp expanded to two-simultaneous sessions. In the last two years, applications decreased. Overall, six students have enrolled in Gannon University as a result of their summer camp experience.

TABLE I
SUMMER CAMP ENROLLMENT

	2001	2002	2003	2004	2005	2006
Participants	22	20	21	32	19	16
Participants interested in majors offered at Gannon	12	13	16	19	8	8
Enrolled in Gannon	2	2		2		TBA

Survey

Survey data is used to assess the summer camp program's success. Each year, the participants complete an evaluation at the end of the week to assess their response to specific aspects of the program. This evaluation consists of qualitative and quantitative questions rating the activities. Tables 2 and 3 present the responses to the questions related to activities and lectures (the dash indicates that the activity or project was not offered that year). Participants rated the projects and lectures in order of their preference by assigning points to their top three choices (lectures were not weighted from 2001-2004). Individual projects were not rated; this will be modified in future camps.

TABLE 2
SURVEYS' RESULTS RELATED TO SUMMER CAMP PROJECTS

Rank the following projects in order of your preference	2001	2002	2003	2004	2005	2006
Voltmeter	51	50	45	49	30	32
Robotics	39	42	40	47	36	36
Trebuchet	33	42	39	44	30	19
Web Design	-	22	26	-	-	-
Video	-	-	-	18	8	15
Beam	-	-	-	-	-	13
Bioinformatics	-	-	-	-	-	4
Computer Bioforensics	-	-	-	-	-	7
Water Quality Parameters	-	-	-	-	-	10

Post Survey

In an effort to gather more data, an email with four questions was sent out to the 2004-2006 participants. The four questions asked were:

- What is your current field of study or degree status?
- Did attending the summer camp influence your choice of major in engineering?
- Were you considering Gannon University before the camp?
- What college did you choose?

Nine campers responded to the email. Eighty-nine percent stated that the camp had influenced their choice of major. Purdue University, Cornell University, Virginia Tech, Drexel University, West Virginia University, and Gannon University are amongst schools that the former participants are attending. Seventy-eight percent stated that they were not considering Gannon University before the camp.

TABLE 3
SURVEYS' RESULTS RELATED TO SUMMER CAMP LECTURES

Select your three favorite lectures	2001	2002	2003	2004	2005	2006
Introduction to Engineering	11	4	3	13	28	39
Unit Analysis	3	7	3	4	-	-
Information Technology	-	9	6	7	27	25
Requirements and Idea Generation	2	3	2	12	-	-
Variation	13	15	6	8	17	-
Role of Modeling	7	14	8	8	29	32
Problems & Ambiguity	5	-	-	-	-	-
Visualization	6	-	-	-	-	-
Functions, Attributes and Constraints	4	-	-	-	-	-
Measuring Satisfaction	0	-	-	-	-	-
Lecture on Life/Time	7	-	-	-	-	-

DISCUSSION

Through the six years, the summer camp has evolved and improved. The lessons learned from the years could lead to a top ten best-practices list.

Campers are people. Simply because a camper attends an experience about analytical and logical subjects, does not imply that the camper will be fully mature, logical, or agreeable. Personalities may collide; home problems come with the students; ability and interest perceptions between the families, the campers, and the staff will exist.

Effort and patience may be required to cope with the lives of the campers. Considering the students are with the camp for only one week, the need to recognize, address, and resolve situations immediately is pressing – for the sake of the success of the camp, of the exiting impression of the campers, and of the satisfaction of the staff. However, handling these situations falls to the staff members and is often a surprise and an unwanted stress. Staff members are not trained counselors or therapists. Often, the staff directly in contact with the campers the most are college students who have had even less experience with dealing with personality and life conflicts than teaching faculty.

It is important that some of the activities allow campers to work as individuals. It should be understood that some campers do not attend voluntarily, and some others

lack the maturity to behave in an appropriate manner. Either of these situations can lead to lack of social unity, unresponsive or disruptive behavior, and potential unsafe situations. These can be mitigated by allowance for individual work, which can be completed (or not) at the discretion of the individual.

Adolescent people are still developing a sense of self, and are not yet ready to accept a sense of self as supportive of others. It seems that the lesson of the *Environaut* exercise is that students more willingly accept activities that might otherwise be unpleasant, if they relate directly to what they themselves might do (e.g., water and sediment sampling and analysis) than if they relate to what someone else might do, with the support that they provide (e.g., emphasis on how tools for sampling support environmental monitoring and remediation). Focus for activities should be on the activity itself, not on background, enabling activities.

Attempts to "improve" technical content should not be made at the expense of social and recreational time. Scheduling of ample social and recreational time is crucial to satisfying the unwilling camper. Additionally, social time is important to most campers – they want the camp to be fun.

Campers would rather do than listen. Initially the camp had a blend of lecture and hands-on work. Many campers found the lecture time somewhat dry and boring. Even those who enjoyed the lectures preferred the hands-on work. As the camp has evolved, most lecture time has been eliminated and the projects, both the shorter and longer projects, are almost entirely hands-on.

Competition can be healthy. Although entrance into the camp is not competitive, some activities did include a competition. Through this mechanism several effects are realized that would be difficult to achieve in a week's time, otherwise. First, differential levels of performance are exhibited. To the individual participant, his/her performance – and interest in the activity – can provide insight into a capacity for an engineering major. Second, the competition enabled teams, bonded the members, and provided a motivating factor to their interactions. Individuals who naturally gravitated to competitions reacted positively; individuals who were less team-motivated were drawn into the core of the team because their interest in the activity was aroused. Third, performing well in the competitions increased the satisfaction of the campers. Campers competent in an activity were rewarded for their competency, publicly to their families, interactively within peer groups, and without bias by camp staff. Members on winning teams gained peer approval and succeeded relative to their peers in a demonstrable fashion. Few episodes in their high school experiences provide this level of recognition. Yet, recognition of this caliber is sought by students of the "millennial generation" [1]-[3].

Shoestring budgets are limiting. Camp experiences require funds – and often more than what is expected and planned. Staff wants to offer professional and impressive experiences. With a highly limited budget, the experiences may become more like DIY ("do-it-yourself") escapades than like academic practices. Without a defined mission and with limited funds, the tendency to "scrape together" a meaningful week can become rampant.

Further, to the campers, the experience also has a social component. Providing a healthy, safe, and satisfying living experience can be planned. However, the necessary support services and staff required to ease unexpected situations may stretch the resources of even well-funded programs. A simple example of such "unexpected situations" occurred when the roof of the building for an evening's activities was blown off with high winds the night before. Twenty-four sixteen-year-old students still needed an activity – preferably a low-cost, easily monitored, out-of-the-weather, and "fun" activity.

Keep the main thing, the main thing. During the first four years of the camp, it was scheduled from Sunday afternoon to Saturday morning. In the last two years, the camp has ended Friday night. Originally, Saturday morning included a tour and a talk by Admissions Office. The extra night in the dormitory became an unnecessary expense on the camp budget and an unwanted burden on families.

Once a range of attendance levels has been set, it may be unwise to alter it to accommodate excess demand. The number of camp attendees is critical to both financial and programmatic success. Specifically the camp enrollment cap was expanded by 50% in one year, as a response to overwhelming camper interest. Logistically, such expansion was made possible by creating parallel sessions for many activities. Campers were brought together for activities whenever permitted by facilities. Extra student assistants were hired to compensate for increased workload, but there was no realistic way to increase the number of faculty participants. Thus burden on faculty participants increased, straining the bounds of what each faculty member desired to give. In the end, the financial picture as a result of the expansion was also unfavorable, as the cost of additional assistance, plus per-student costs exceeded the extra revenue due to enhanced participation.

Camp should have a defined mission. The planning, organizing, funding, assessing, and explaining of a camp benefit whenever a clear raison d'être is articulated. The mission would define the appropriate audience, provide a benchmark for success evaluation, and govern the content and experiences defined for the camp. Without a mission, the camp may suffer the malaise expressed by the sentiment, "So what? Why bother? Who cares"?

CONCLUSION

We feel the main goal of camp has been achieved: students leave with an appreciation for engineering. But as with all programs, assessment must be conducted to determine continuance.

REFERENCES

[1] Coates, J., *Generational Learning Styles*, River Falls, WI, 2003.

[2] Strauss, W. and Howe, N., *Generations: The history of America's future, 1584-2069*, New York, Morrow/Quill, 1991.

[3] Tapscott, D., Growing up digital: *The rise of the Net Generation*, New York, McGraw-Hill, 1998.